

## 9. Treatment

### 9.1. Methods

The cases selected for this analysis were patients with primary malignant tumours of the sites listed in section 2.2.1 and in Table 9.1 below who were diagnosed in the Republic of Ireland during the five-year period from 1994 to 1998. In the case of patients who had more than one cancer, the record with the earlier date of diagnosis was retained. A total of 39681 cases satisfied these criteria. A total of 248 patients were excluded because they were aged under 15 or over 100 years at the time of diagnosis (n=244) or because their address could not be assigned to a health board area (n=4). A further 63 male breast cancer cases were also excluded from this analysis, leaving a total of 39370 patients (Table 9.1).

“Eastern Health Board” has been retained as the description of the area now covered by the Eastern Regional Health Authority (ERHA), as that was the designation of the area in question in 1994 – 1998.

Table 9.1 Cancer patients included in treatment analysis; by site and sex.

SITE	SEX		
	female	male	both sexes
stomach	853	1441	2294
colorectal	3669	4788	8457
lung	2504	4773	7277
skin melanoma	1155	683	1838
breast (female)	7856	0	7856
prostate		5618	5618
bladder*	625	1588	2213
lymphomas	1078	1222	2300
leukaemia	632	885	1517
total	18372	20998	39370

\*As a preliminary analysis of bladder cancer suggested inconsistencies over time in the recording of removal of bladder tumours by coagulation, the section on treatment of bladder cancer has been omitted.

Cases were staged using a combined TNM staging system.<sup>21</sup> When possible, pathological staging was used, supplemented by clinical staging when pathological staging was not available. This TNM stage was then translated into a “summary stage” (I to IV).

Treatments included all cancer-directed therapy (surgery, radiotherapy, hormonal and chemotherapy) performed within six months of diagnosis. In the absence of any explicit information on treatment intent in the majority of cases, all treatment during this six-month period was taken to be part of the primary course of care. Treatment given for recurrence, for failure to respond to initial therapy or for metastasis not present at the time of initial diagnosis is not registered and is not reported on here.

Surgical and other treatments were coded using the Registry’s Treatment and Procedures Coding Manual (a simplified version of the relevant chapters of the ICD-9-CM).<sup>22</sup> Patients were deemed to have had surgery if they underwent open excisional biopsy or partial, total or radical removal of the affected organ. Closed biopsy and procedures not directed at reducing tumour mass (e.g. palliative or reconstructive operations) were not considered as cancer-directed surgery and patients who received only this type of treatment were included in the “no treatment” category. Chemotherapy was defined as the oral administration, injection or infusion of a non-hormonal chemotherapeutic substance. Hormonal therapy did not include endocrine surgery and has only been analysed for cases of breast and prostate cancer. Patients for whom no surgery, radiotherapy or chemo/hormonal therapies were reported were classified in the “no treatment” group.

The analysis consisted of descriptive statistics (mainly cross tabulations) to identify current treatment patterns and trends across time and by health board of residence. For each site, the first table presents the percentages of patients receiving individual modalities of care (i.e. surgery, radiology, chemotherapy and hormonal therapy) while the percentages receiving various combinations of these therapies are described in the second table. In interpreting these tables, it is important to note that these percentages are not adjusted for potential confounding by age, sex or stage. The subsequent sections present the results of multivariate logistic regression which was used, mainly, to adjust for the potential effects of age at diagnosis, gender and stage on time and geographic trends of cancer treatment. For ease of interpretation, only odds ratios (ORs) whose 95% confidence intervals (95% C.I.) did not include 1 (no difference) are presented. In that sense, all logistic regression results reported were significant at  $P < 0.05$ .

**9.2. Colorectal Cancer** ICD - 10 C18 - C21

Table 9.2 and Figure 9.1 summarize treatment patterns for colorectal cancer cases diagnosed in the period 1994 to 1998. Overall, 18% of these patients received no cancer-specific treatment. This proportion ranged from 3% among stage I cases to 37% among those with stage IV disease and increased from 7% among the youngest age group (<55 years) to 37% among those aged 80 or more. This later figure is substantially higher than the corresponding US figure, which was 13% in 1993.<sup>23</sup> Some of the differences observed could be explained by earlier stage at presentation in the US, where the ratio of early (stage I and II) to late disease (stage III and IV) is 1.2 compared to 0.76 in Ireland.

Surgery was the most commonly used treatment modality. Seventy eight percent of patients were treated by surgery, with or without adjuvant therapy. Surgery was more frequently performed on young patients (85% among the under – 55s) and in the North Eastern Health Board. Chemotherapy was used, with or without, surgery in 23% of the cases. Younger patients were more likely to receive chemotherapy (51% in the under – 55 year olds compared to 2% in the over 80 age group). Anal and rectal tumours were more likely to be treated with radiotherapy than colon cancers.

Over the time frame of this report, the proportion of patients treated with radiotherapy and chemotherapy has steadily increased (Figure 9.2) while the proportion of patients treated surgically has remained the same. The proportion of patients who received no cancer-specific treatment declined from 20% in 1994 to 17% in 1998.

Multiple logistic regression analysis indicated that patients were less likely to receive tumour-specific treatment if they were older or if they had stage IV disease. Compared to the Eastern Health Board, patients residing in the North Eastern Health Board catchment area were more likely to be treated (OR=1.6, 95% CI 1.2 - 2.0) while those residing in the South Eastern Health Board were less likely to receive tumour-directed treatment (OR=0.6, 95% CI 0.5 - 0.7).

Table 9.3 shows the various combinations of cancer-specific treatment modalities used to treat colorectal cancer. Patients were mostly treated with surgery only (55%) or with surgery and chemotherapy (16%). Use of adjuvant chemotherapy for stage III is recommended. Forty three percent of stage III patients received adjuvant chemotherapy, substantially higher than the 1993 US figure (22%).

Figure 9.1 Percentage of cases receiving treatment, 1994 – 1998\*: colorectal cancer

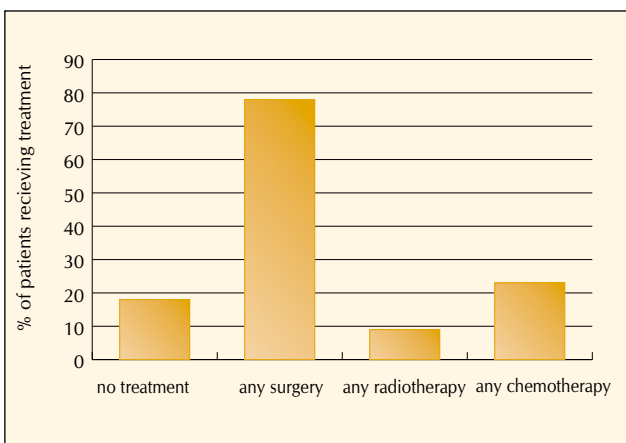
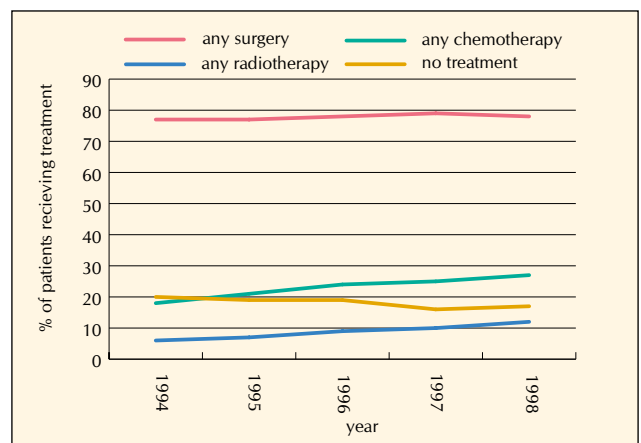


Figure 9.2 Percentage of cases receiving treatment by year of incidence: colorectal cancer



\* Because treatment groups are not mutually exclusive, percentages do not total to 100%.

Table 9.2 Percentage of cases receiving treatment modality by selected patient and tumour characteristics, 1994 – 1998: colorectal cancer\*

	NO TREATMENT	ANY SURGERY	ANY RADIO	ANY CHEMO	TOTAL
all	1534 (18%)	6585 (78%)	752 (9%)	1969 (23%)	8457
<b>age group</b>					
15 – 54	76 (7%)	917 (85%)	179 (17%)	551 (51%)	1076
55 – 64	169 (10%)	1457 (85%)	225 (13%)	659 (38%)	1712
65 – 69	168 (13%)	1079 (82%)	136 (10%)	369 (28%)	1315
70 – 74	269 (18%)	1145 (78%)	131 (9%)	237 (16%)	1467
75 – 79	293 (21%)	1043 (76%)	51 (4%)	127 (9%)	1368
80 +	559 (37%)	944 (62%)	30 (2%)	26 (2%)	1519
<b>sex</b>					
female	698 (19%)	2854 (78%)	262 (7%)	805 (22%)	3669
male	836 (17%)	3731 (78%)	490 (10%)	1164 (24%)	4788
<b>site</b>					
colon	988 (19%)	4187 (79%)	162 (3%)	1245 (23%)	5310
recto-sigmoid junction	111 (16%)	539 (80%)	78 (12%)	163 (24%)	673
rectum	416 (18%)	1795 (76%)	470 (20%)	528 (22%)	2367
anus	19 (18%)	64 (60%)	42 (39%)	33 (31%)	107
<b>stage</b>					
I	20 (3%)	726 (97%)	22 (3%)	58 (8%)	748
II	33 (2%)	1350 (97%)	105 (8%)	311 (22%)	1392
III	21 (2%)	1014 (97%)	140 (13%)	451 (43%)	1048
IV	658 (37%)	916 (52%)	136 (8%)	526 (30%)	1777
unknown	802 (23%)	2579 (74%)	349 (10%)	623 (18%)	3492
<b>health board</b>					
Eastern	460 (16%)	2210 (79%)	332 (12%)	711 (25%)	2797
Midland	95 (19%)	384 (78%)	36 (7%)	118 (24%)	493
Mid Western	99 (16%)	519 (82%)	32 (5%)	132 (21%)	631
North Eastern	95 (14%)	584 (84%)	45 (6%)	158 (23%)	694
North Western	124 (20%)	445 (73%)	61 (10%)	191 (31%)	609
Southern	300 (21%)	1071 (75%)	93 (7%)	217 (15%)	1423
South Eastern	199 (22%)	659 (74%)	76 (8%)	249 (28%)	896
Western	162 (18%)	713 (78%)	77 (8%)	193 (21%)	914

\* Because treatment groups are not mutually exclusive, percentages do not total to 100%.

Table 9.3. Percentage of cases receiving combination therapies, by age group; 1994 – 1998: colorectal cancer

AGE	SURGERY ONLY	RADIO ONLY	CHEMO ONLY	SURGERY & RADIO	SURGERY & CHEMO	RADIO & CHEMO	SURGERY, RADIO & CHEMO	NO TREATMENT	ALL CASES
all	4657 (55%)	93 (1%)	163 (2%)	204 (2%)	1351 (16%)	82 (1%)	373 (4%)	1534 (18%)	8457
< 70	1946 (47%)	44 (1%)	128 (3%)	121 (3%)	1076 (26%)	65 (2%)	310 (8%)	413 (10%)	4103
70+	2711 (62%)	49 (1%)	35 (1%)	83 (2%)	275 (6%)	17 (0%)	63 (1%)	1121(26%)	4354

9.3. Female Breast Cancer ICD - 10 C50

Figure 9.3 and Table 9.4 summarize treatment patterns for female breast cancer cases diagnosed in the period 1994 to 1998. Only a small percentage (5%) of these patients received no cancer-specific treatment. This figure was only 3% among women in the under - 80 age group but it substantially increased to 16% in the 80 or above age group. Similarly, the percentage of untreated women increased to 18% among those with stage IV disease from only 1% among those with no distant metastases. In the US, only 2.4% of women received no treatment in 1995, a figure that increased to 8.6% for stage IV cases.<sup>24</sup>

Surgery was the most commonly used treatment modality. Eighty-three percent of patients were treated surgically. The corresponding figure in the US 1995 data was 95%. Except for hormonal therapy, all treatment modalities were more frequently directed towards younger patients. The proportion of women treated with hormones increased from 22% in the youngest age group (<40 years) to 57% among women 80 years or older. Patients residing in the Western, North Western and Mid Western Health Boards were less likely to receive radiotherapy than those residing in areas served by the other health boards.

Multiple logistic regression analysis indicates that the proportion of patients treated with radiotherapy has steadily increased from 35% in 1994 to 42% in 1998 (Figure 9.4) while the proportion of patients treated surgically has remained constant. The former trend was statistically significant and could not be explained by changes in age or stage composition of the group. The proportion of patients who received no cancer-specific treatment remained the same.

Table 9.5 shows the various combinations of cancer-specific treatment modalities used to treat female breast cancer. Combination therapy was very widely used. Nearly 80% of the patients had at least two treatment modalities as part of their primary course of care. The most commonly employed combinations were surgery and chemotherapy (17%), surgery and hormonal (15%) and surgery, radiotherapy and chemotherapy (13%). Younger women were more likely to receive combination therapy. Women over 80 were more likely to be treated with a single modality, most commonly hormonal therapy (26%).

Figure 9.3 Percentage of cases receiving treatment, 1994 – 1998\*: female breast cancer

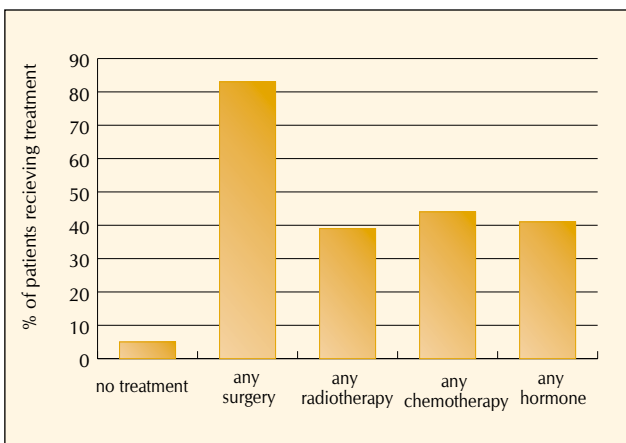
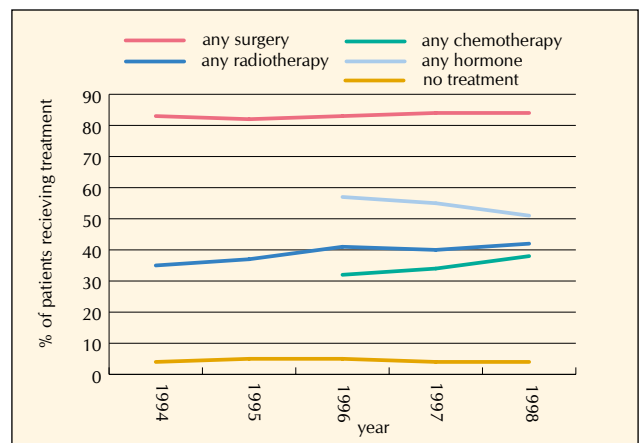


Figure 9.4 Percentage of cases receiving treatment by year of incidence: female breast cancer



\* Because treatment groups are not mutually exclusive, percentages do not total to 100%.

Table 9.4 Percentage of cases receiving treatment modality by selected patient and tumour characteristics, 1994 – 1998: female breast cancer\*

	NO TREATMENT	ANY SURGERY	ANY RADIO	ANY CHEMO	ANY HORMONE	ALL CASES
all	354 (5%)	6549 (83%)	3075 (39%)	3431 (44%)	3250 (41%)	7856
<b>age group</b>						
15 – 39	7 (1%)	497 (93%)	273 (51%)	387 (73%)	116 (22%)	533
40 – 49	41 (3%)	1431 (92%)	727 (47%)	1015 (65%)	408 (26%)	1558
50 – 59	53 (3%)	1756 (91%)	887 (46%)	998 (52%)	753 (39%)	1936
60 – 69	54 (3%)	1463 (88%)	685 (41%)	585 (35%)	795 (48%)	1664
70 – 79	84 (6%)	1065 (75%)	408 (29%)	339 (24%)	754 (53%)	1427
80+	115 (16%)	337 (46%)	95 (13%)	107 (14%)	424 (57%)	738
<b>stage</b>						
I	5 (1%)	816 (97%)	376 (45%)	293 (35%)	341 (41%)	841
IIA	10 (1%)	1117 (96%)	491 (42%)	589 (51%)	485 (42%)	1163
IIB	7 (1%)	830 (95%)	370 (42%)	588 (67%)	343 (39%)	874
IIIA	0 (0%)	261 (94%)	131 (47%)	195 (70%)	89 (32%)	278
IIIB	6 (3%)	150 (73%)	83 (40%)	123 (60%)	75 (36%)	206
IV	105 (18%)	205 (35%)	189 (32%)	258 (44%)	236 (40%)	591
unknown	221 (6%)	3170 (81%)	1435 (37%)	1385 (35%)	1681 (43%)	3903
<b>health board</b>						
Eastern	154 (5%)	2448 (83%)	1226 (42%)	1225 (42%)	946 (32%)	2936
Midland	22 (5%)	405 (85%)	195 (41%)	221 (46%)	179 (38%)	476
Mid Western	26 (4%)	541 (84%)	206 (32%)	255 (40%)	266 (41%)	642
North Eastern	26 (5%)	492 (86%)	225 (39%)	240 (42%)	237 (41%)	574
North Western	20 (4%)	388 (81%)	151 (32%)	228 (48%)	203 (42%)	478
Southern	51 (4%)	1005 (81%)	528 (42%)	570 (46%)	665 (53%)	1243
South Eastern	25 (3%)	644 (83%)	371 (48%)	331 (43%)	413 (53%)	776
Western	30 (4%)	626 (86%)	173 (24%)	361 (49%)	341 (47%)	731

\* Because treatment groups are not mutually exclusive, percentages do not total to 100%.

Table 9.5 Percentage of cases receiving combination therapies, by age group, 1994 – 1998: female breast cancer

AGE	SURGERY ONLY	HORMONE ONLY	SURGERY & CHEMO	SURGERY & HORMONE	SURGERY, RADIO & CHEMO	HORMONE & RADIO	SURGERY, HORMONE RADIO & CHEMO	OTHER COMBO	NO TREATMENT	ALL CASES
all	883 (11%)	416 (5%)	1352 (17%)	1243 (15%)	1058 (13%)	796 (10%)	353 (4%)	1401 (17%)	354 (4%)	7856
<80	817 (11%)	220 (3%)	1300 (18%)	1074 (15%)	1053 (14%)	767 (10%)	352 (4%)	1296 (18%)	239 (3%)	7118
80+	66 (8%)	196 (26%)	52 (7%)	169 (22%)	5 (0%)	29 (3%)	1 (0%)	105 (14%)	115 (16%)	738

**9.4. Lung Cancer ICD - 10 C34**

Table 9.6 and Figure 9.5 summarize treatment patterns for lung cancer cases diagnosed in the period 1994 to 1998. Overall, half of these patients received no cancer-specific treatment. This figure increased from 26% among the youngest age group (<55 years) to 83% among those aged 80 or more. A larger proportion of non-small cell carcinoma patients received no treatment (53% compared to 32% for small cell carcinoma). The corresponding figures from US 1992 data were 20% and 15% respectively.<sup>25</sup>

For non-small cell carcinoma, radiotherapy was the most commonly used treatment modality (29%) followed by surgery (17%). Chemotherapy was the main therapeutic modality for small cell lung cancer (59%), followed by radiotherapy (24%). All treatment modalities were more frequently directed towards young patients.

Over the time frame of this report, the proportion of patients treated with radiotherapy has increased from 27% in 1994 to 33% in 1998 (Figure 9.6). This trend was statistically significant and persisted after controlling for age, gender and stage composition of the group. On the other hand, the proportion of patients treated surgically declined significantly. The proportion of patients who received no cancer-specific treatment remained the same.

Multiple logistic regression analysis indicated that patients were less likely to receive tumour-specific treatment if they were older (e.g. a patient aged 75 to 79 years was five times less likely to receive treatment than one under 55 of the same sex, stage and health board). Patients with stage IV disease were also less likely to be treated (OR=3.6, 95% CI 2.7 - 4.8). Patients residing in the Eastern and Southern Health Boards were more likely to receive radiotherapy than those residing in areas served by the other health boards. Patients were least likely to receive radiotherapy if they resided in the Mid Western (OR relative to EHB=2.0, 95% CI=1.6 - 2.4) or in the Western Health Board (OR relative to EHB =1.9, 95% CI=1.5 - 2.3). Radiotherapy facilities are concentrated in the Eastern and Southern Health Boards and differences in ease of accessibility to these services might explain some of the observed patterns.

Table 9.7 shows the various combinations of cancer-specific treatment modalities used to treat lung cancer. Few patients (7%) received combination therapy. Most treated patients received radiotherapy only or surgery only.

Figure 9.5 Percentage of cases receiving treatment, 1994 – 1998\*: lung cancer

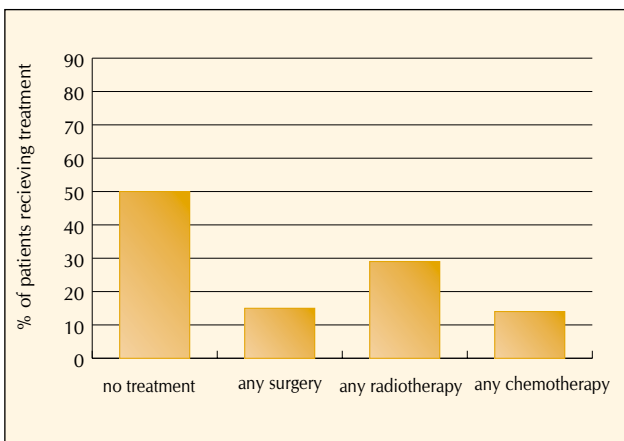
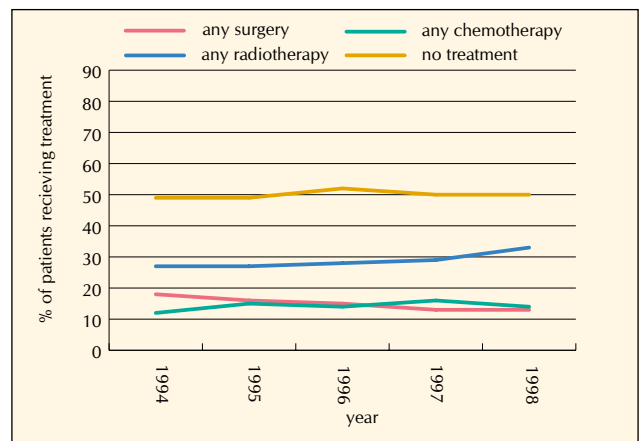


Figure 9.6 Percentage of cases receiving treatment by year of incidence: lung cancer



\* Because treatment groups are not mutually exclusive, percentages do not total to 100%.

Table 9.6 Percentage of cases receiving treatment modality by selected patient and tumour characteristics, 1994 – 1998: lung cancer\*

	NO TREATMENT	ANY SURGERY	ANY RADIO	ANY CHEMO	TOTAL
all	3632 (50%)	1093 (15%)	2091 (29%)	1035 (14%)	7277
<b>age group</b>					
15 – 54	181 (26%)	171 (25%)	270 (39%)	220 (32%)	697
55 – 64	467 (33%)	289 (20%)	545 (38%)	324 (23%)	1428
65 – 69	576 (42%)	259 (19%)	435 (32%)	228 (17%)	1376
70 – 74	757 (51%)	248 (17%)	402 (27%)	166 (11%)	1495
75 – 79	803 (64%)	106 (8%)	305 (24%)	76 (6%)	1261
80+	848 (83%)	20 (2%)	134 (13%)	21 (2%)	1020
<b>sex</b>					
female	1298 (52%)	335 (13%)	664 (27%)	405 (16%)	2504
male	2334 (49%)	758 (16%)	1427 (30%)	630 (13%)	4773
<b>category</b>					
small cell	319 (32%)	34 (3%)	244 (24%)	596 (59%)	1012
non-small cell	3313 (53%)	1059 (17%)	1847 (29%)	439 (7%)	6265
<b>stage</b>					
I	74 (24%)	187 (60%)	54 (17%)	21 (7%)	313
II	25 (19%)	74 (57%)	34 (26%)	16 (12%)	129
III	105 (26%)	94 (24%)	187 (47%)	97 (24%)	400
IV	991 (53%)	66 (4%)	625 (34%)	314 (17%)	1856
unknown	2437 (53%)	672 (15%)	1191 (26%)	587 (13%)	4579
<b>health board</b>					
Eastern	1285 (43%)	543 (18%)	969 (32%)	460 (15%)	3000
Midland	194 (52%)	55 (15%)	112 (30%)	36 (10%)	371
Mid Western	349 (64%)	58 (11%)	112 (21%)	57 (10%)	543
North Eastern	296 (55%)	79 (15%)	126 (24%)	63 (12%)	535
North Western	264 (56%)	49 (10%)	130 (27%)	61 (13%)	475
Southern	447 (44%)	155 (15%)	344 (34%)	144 (14%)	1008
South Eastern	438 (59%)	104 (14%)	175 (24%)	85 (11%)	740
Western	359 (59%)	50 (8%)	123 (20%)	129 (21%)	605

\* Because treatment groups are not mutually exclusive, percentages do not total to 100%.

Table 9.7. Percentage of cases receiving combination therapies, by age group, 1994 – 1998: lung cancer

AGE	SURGERY ONLY	RADIO ONLY	CHEMO ONLY	SURGERY & RADIO	SURGERY & CHEMO	RADIO & CHEMO	SURGERY, RADIO & CHEMO	NO TREATMENT	ALL CASES
all	860 (12%)	1565 (22%)	635 (9%)	155 (2%)	29 (<1%)	352 (5%)	19 (<1%)	3632 (50%)	7277
<70	552 (16%)	828 (24%)	451 (13%)	125 (4%)	24 (1%)	279 (8%)	18 (1%)	1224 (35%)	3501
70+	338 (9%)	737 (20%)	184 (5%)	30 (1%)	5 (0%)	73 (2%)	1 (0%)	2408 (64%)	3776

**9.5. Prostate Cancer ICD – 10 C61**

Table 9.8 and Figure 9.7 summarize treatment patterns for prostate cancer cases diagnosed in the period 1994 to 1998. Overall, nearly a quarter (24%) of these patients received no cancer-specific treatment. This is the same figure reported for the US in 1996.<sup>26</sup> In Ireland, the proportion of untreated patients increased from 13% among the youngest age group (<60 years) to 32% among those aged 85 or more.

Surgery was the most commonly used treatment modality. Fifty-four percent of patients were treated surgically. Younger men were more likely to be treated with surgery and / or radiotherapy (Table 9.8). Older men were more likely to receive hormonal therapy. Hormonal therapy was also the most commonly used treatment for men with distant metastases (58% compared to 21% in stage I cases). Patients residing in the North Western and Western Health Boards were more likely to receive hormonal therapy, and those residing in the North and Mid Western Health Boards were less likely to undergo surgery, than those residing in counties served by the other health boards.

Over the time frame of this report, the proportion of patients treated with hormonal therapy has steadily increased from 23% in 1994 to 41% in 1998 (Figure 9.8). This trend was statistically significant and persisted after adjusting for age and stage composition of the group, but could be partly due to improved recording of hormonal treatment information in recent years. The proportion of patients who received radiotherapy remained the same.

Table 9.9 shows the various combinations of cancer-specific treatment modalities used to treat prostate cancer. Few patients (15%) received combination therapy. Most treated patients received surgery only (39%) or hormonal therapy only (19%). Surgery and hormonal treatment were the most commonly employed combination regime (13%).

Figure 9.7 Percentage of cases receiving treatment, 1994 – 1998\*: prostate cancer

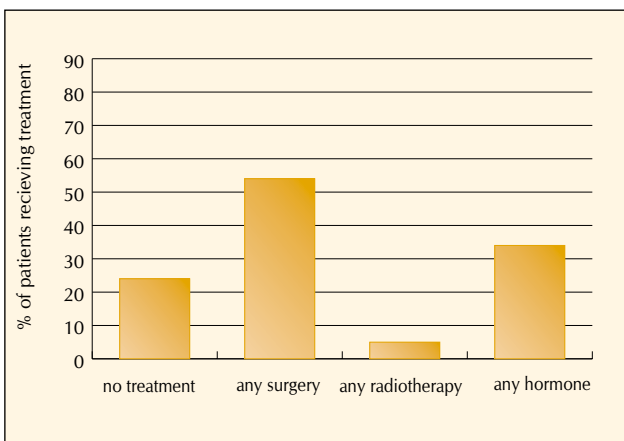
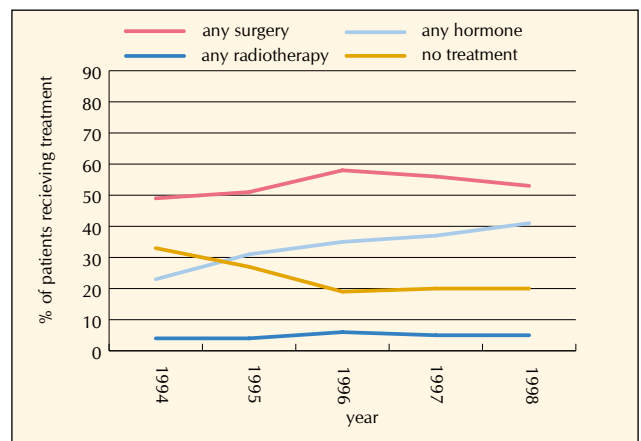


Figure 9.8 Percentage of cases receiving treatment by year of incidence: prostate cancer



\* Because treatment groups are not mutually exclusive, percentages do not total to 100%.

Table 9.8 Percentage of cases receiving treatment modality by selected patient and tumour characteristics, 1994 – 1998: prostate cancer\*

	NO TREATMENT	ANY SURGERY	ANY RADIO	ANY HORMONE	TOTAL
all	1330 (24%)	3006 (54%)	288 (5%)	1904 (34%)	5618
<b>age group</b>					
15 – 59	47 (13%)	237 (65%)	45 (12%)	106 (29%)	363
60 – 64	94 (18%)	322 (61%)	52 (10%)	156 (29%)	529
65 – 69	174 (19%)	540 (59%)	84 (9%)	281 (31%)	917
70 – 74	303 (24%)	691 (54%)	61 (5%)	478 (37%)	1286
75 – 79	311 (26%)	628 (53%)	28 (2%)	413 (35%)	1196
80 – 84	251 (29%)	392 (46%)	15 (2%)	296 (35%)	851
85+	150 (32%)	196 (41%)	3 (1%)	174 (37%)	476
<b>stage</b>					
I	19 (17%)	81 (74%)	4 (4%)	23 (21%)	110
II	18 (10%)	149 (80%)	7 (4%)	28 (15%)	186
III	7 (12%)	52 (87%)	2 (3%)	7 (12%)	60
IV	278 (22%)	444 (35%)	108 (9%)	722 (58%)	1252
unknown	1008 (25%)	2280 (57%)	167 (4%)	1124 (28%)	4010
<b>health board</b>					
Eastern	409 (24%)	1059 (62%)	95 (6%)	365 (21%)	1704
Midland	104 (29%)	193 (55%)	11 (3%)	107 (30%)	353
Mid Western	78 (17%)	268 (60%)	29 (6%)	145 (32%)	448
North Eastern	129 (28%)	258 (57%)	10 (2%)	132 (29%)	454
North Western	55 (14%)	148 (37%)	10 (3%)	284 (72%)	396
Southern	206 (23%)	450 (50%)	66 (7%)	341 (38%)	907
South Eastern	161 (23%)	418 (59%)	24 (3%)	204 (29%)	705
Western	188 (29%)	212 (33%)	43 (7%)	326 (50%)	651

\* Because treatment groups are not mutually exclusive, percentages do not total to 100%.

Table 9.9 Percentage of cases receiving combination therapies, by age group, 1994 – 1998: prostate cancer

AGE	SURGERY ONLY	RADIO ONLY	HORMONE ONLY	SURGERY & RADIO	SURGERY & HORMONE	HORMONE & RADIO	SURGERY, HORMONE & RADIO	NO TREATMENT	ALL CASES
all	2190 (39%)	124 (2%)	1087 (19%)	70 (1%)	723 (13%)	71 (1%)	23 (0%)	1330 (24%)	5618
< 75	1294 (42%)	102 (3%)	526 (17%)	60 (2%)	415 (13%)	59 (2%)	21 (1%)	618 (20%)	3095
75+	896 (36%)	22 (1%)	561 (22%)	10 (0%)	308 (12%)	12 (0%)	2 (0%)	712 (28%)	2523

9.6. Stomach Cancer ICD - 10 C16

Table 9.10 and Figure 9.9 summarize treatment patterns for stomach cancer cases diagnosed in the period 1994 to 1998. Overall, half of these patients received no cancer-specific treatment. The proportion of those not treated increased from 23% among the youngest age group (<50 years) to 78% among those aged 80 or more at diagnosis and ranged from 46% in the North Eastern Health Board to 56% in the South Eastern Health Board. It was also higher among those with advanced stage cancer at diagnosis (66% in stage IV patients). These figures were generally substantially higher than 1993 US figures (e.g. in the US, only 36% of stage IV patients received no treatment).<sup>27</sup>

Surgery was the most commonly used treatment modality. Forty four percent of patients were treated surgically with or without adjuvant therapy. Surgery was more frequently performed in young patients (62% among <50) and in the North Eastern Health Board.

Over the time frame of this report, the proportion of patients treated with radiotherapy and chemotherapy has gradually increased (Figure 9.10). This trend, however, was not statistically significant

Multiple logistic regression analysis indicated that patients were less likely to receive tumour-specific treatment if they were older (Odds Ratio OR=3.3, 95% CI 2.6 - 4.2 for those older than 59 years) or if they had stage IV disease (OR=10.7, 95% CI 6.2 - 18.5). Patients residing in the North Eastern Health Board catchment area were more likely to be treated (OR=1.6, 95% CI 1.2 - 2.3). The differences between the other health boards were not statistically significant.

Table 9.11 shows the various combinations of cancer-specific treatment modalities used to treat stomach cancer. Most treated patients received surgery alone. Four percent of the patients were treated with chemotherapy alone and a further two percent received both surgery and chemotherapy.

Figure 9.9 Percentage of cases receiving treatment, 1994 – 1998\*: stomach cancer

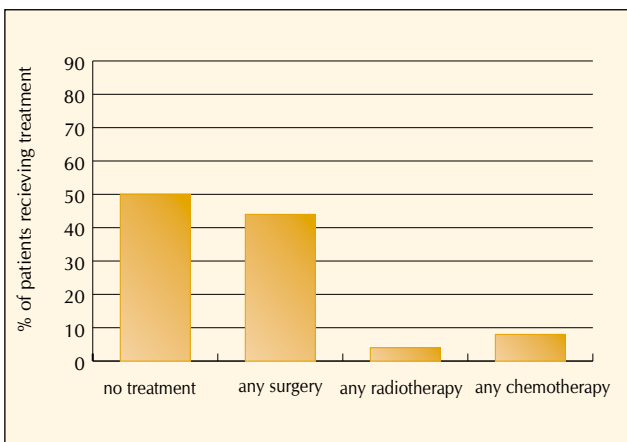
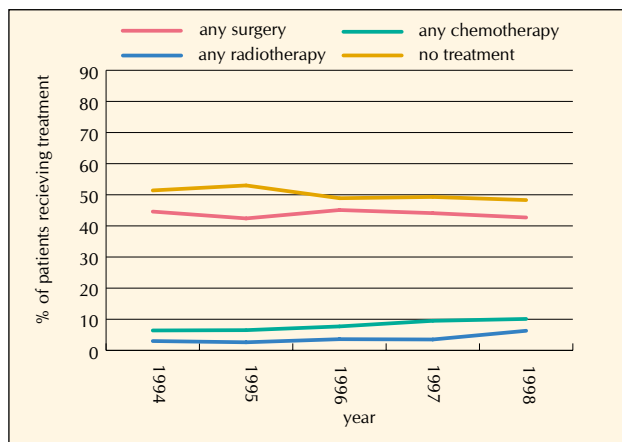


Figure 9.10 Percentage of cases receiving treatment by year of incidence: stomach cancer



\* Because treatment groups are not mutually exclusive, percentages do not total to 100%.

Table 9.10 Percentage of cases receiving treatment modality by selected patient and tumour characteristics, 1994 – 1998: stomach cancer\*

	NO TREATMENT	ANY SURGERY	ANY RADIO	ANY CHEMO	TOTAL
all	1152 (50%)	1004 (44%)	87 (4%)	184 (8%)	2294
<b>age group</b>					
15 – 49	38 (23%)	104 (62%)	8 (5%)	50 (30%)	168
50 – 59	91 (33%)	149 (54%)	21 (8%)	50 (18%)	276
60 – 69	254 (43%)	307 (51%)	28 (5%)	51 (9%)	598
70 – 79	376 (50%)	339 (45%)	23 (3%)	32 (4%)	747
80+	393 (78%)	105 (21%)	7 (1%)	1 (0%)	505
<b>sex</b>					
female	447 (52%)	365 (43%)	21 (3%)	51 (6%)	853
male	705 (49%)	639 (44%)	66 (5%)	133 (9%)	1441
<b>stage</b>					
I	18 (15%)	102 (84%)	4 (3%)	6 (5%)	122
II	6 (5%)	104 (94%)	2 (2%)	7 (6%)	111
III	28 (12%)	198 (85%)	7 (3%)	22 (9%)	233
IV	446 (66%)	152 (23%)	22 (3%)	80 (12%)	672
unknown	654 (57%)	448 (39%)	52 (5%)	69 (6%)	1156
<b>health board</b>					
Eastern	435 (51%)	365 (42%)	47 (6%)	70 (8%)	861
Midland	62 (47%)	63 (48%)	4 (3%)	9 (7%)	132
Mid Western	80 (49%)	77 (47%)	6 (4%)	11 (7%)	165
North Eastern	109 (46%)	124 (52%)	5 (2%)	17 (7%)	237
North Western	71 (49%)	69 (48%)	4 (3%)	6 (4%)	145
Southern	151 (51%)	119 (40%)	8 (3%)	34 (11%)	298
South Eastern	126 (56%)	85 (38%)	6 (3%)	23 (10%)	226
Western	118 (51%)	102 (44%)	7 (3%)	14 (6%)	230

\* Because treatment groups are not mutually exclusive, percentages do not total to 100%.

Table 9.11 Percentage of cases receiving combination therapies, by age group, 1994 – 1998: stomach cancer

AGE	SURGERY	RADIO	CHEMO	SURGERY & RADIO	SURGERY & CHEMO	RADIO & CHEMO	SURGERY, RADIO & CHEMO	NO TREATMENT	ALL CASES
all	913 (40%)	32 (1%)	86 (4%)	13 (1%)	56 (2%)	20 (1%)	22 (1%)	1152 (50%)	2294
<70	483 (46%)	14 (1%)	72 (7%)	11 (1%)	47 (5%)	13 (1%)	19 (2%)	383 (37%)	1042
70+	430 (34%)	18 (1%)	14 (1%)	2 (0%)	9 (1%)	7 (1%)	3 (0%)	769 (61%)	1252

### 9.7. Lymphomas ICD - 10 C81 - C85

Table 9.12 and Figure 9.11 summarize treatment patterns for lymphoma cases diagnosed in the period 1994 to 1998. Overall, 22% of these patients received no cancer-specific treatment. This proportion increased from 11% among the youngest age group (< 30 years) to 40% among those aged 80 or more and was higher in the Midland and North Western Health Boards (28% and 26% respectively).

Chemotherapy was the most commonly used treatment modality. Sixty three percent of patients were treated with chemotherapy. This proportion was higher among Hodgkin’s disease sufferers and those diagnosed with stage II and III disease, and declined from 80% among the under - 30 to 40% among the oldest age group (80 years or older). Radiotherapy was more widely used in the treatment of Hodgkin’s disease (22%), stage I cases (31%) and residents of the Southern Health Board (29%) while surgery was more frequently performed for non-Hodgkin’s cases (17%). Out of the 335 patients treated surgically, 260 (78%) had non-Hodgkin’s lymphomas affecting organs other the lymph nodes (e.g. the intestines, stomach and skin).

Over the time frame of this report, the proportion of patients treated surgically has increased significantly, from 11% in 1994 to 20% in 1998 (Figure 9.12) while the proportion of patients treated with chemotherapy and radiotherapy has remained the same.

Table 9.13 shows the various combinations of cancer-specific treatment modalities used to treat lymphomas. Few patients (16%) received combination therapy. Most treated patients received chemotherapy only (48%) or radiotherapy only (8%).

Figure 9.11 Percentage of cases receiving treatment, 1994 – 1998\*: lymphoma

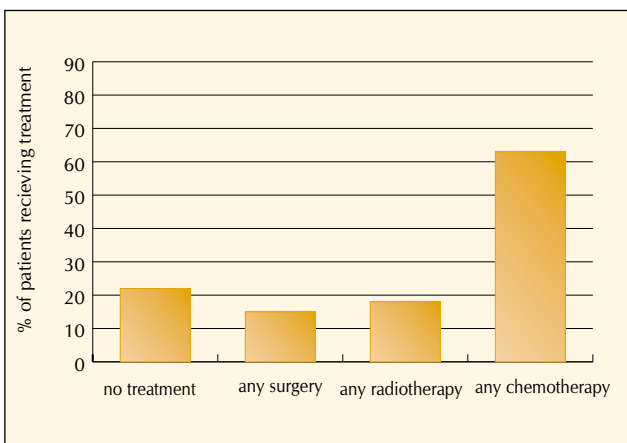
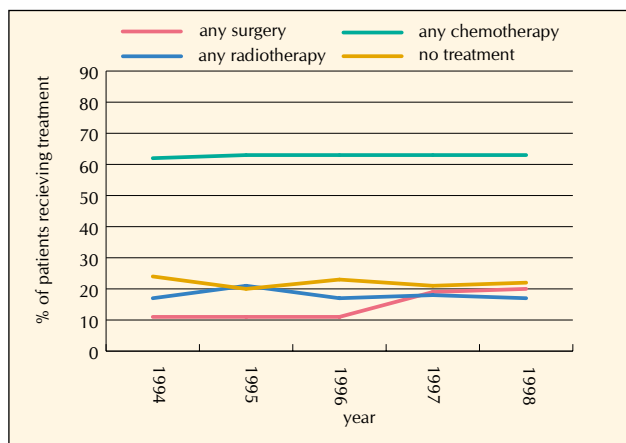


Figure 9.12 Percentage of cases receiving treatment by year of incidence: lymphoma



\* Because treatment groups are not mutually exclusive, percentages do not total to 100%.

Table 9.12 Percentage of cases receiving treatment modality by selected patient and tumour characteristics, 1994 – 1998: lymphoma\*

	NO TREATMENT	ANY SURGERY	ANY RADIO	ANY CHEMO	TOTAL
all	507 (22%)	335 (15%)	410 (18%)	1450 (63%)	2300
<b>age group</b>					
15 – 29	22 (11%)	9 (4%)	39 (19%)	165 (80%)	205
30 – 39	31 (14%)	21 (10%)	43 (20%)	165 (76%)	217
40 – 49	43 (17%)	53 (20%)	50 (19%)	178 (68%)	260
50 – 59	78 (19%)	70 (17%)	73 (18%)	268 (66%)	405
60 – 69	108 (21%)	82 (16%)	83 (16%)	323 (64%)	505
70 – 79	134 (28%)	79 (16%)	81 (17%)	261 (54%)	483
80+	91 (40%)	21 (9%)	41 (18%)	90 (40%)	225
<b>sex</b>					
female	238 (22%)	165 (15%)	205 (19%)	662 (61%)	1078
male	269 (22%)	170 (14%)	205 (17%)	788 (64%)	1222
<b>category</b>					
non-Hodgkin's	465 (24%)	318 (17%)	327 (17%)	1166 (61%)	1916
Hodgkin's	42 (11%)	17 (4%)	83 (22%)	284 (74%)	384
<b>stage</b>					
I	115 (19%)	109 (18%)	186 (31%)	350 (58%)	606
II	54 (12%)	69 (15%)	75 (16%)	358 (76%)	468
III	58 (15%)	32 (8%)	27 (7%)	305 (80%)	382
IV	87 (23%)	59 (16%)	53 (14%)	248 (66%)	377
unknown	193 (41%)	66 (14%)	69 (15%)	189 (40%)	467
<b>health board</b>					
Eastern	194 (24%)	83 (10%)	138 (17%)	520 (64%)	816
Midland	37 (28%)	15 (11%)	22 (17%)	81 (62%)	131
Mid Western	47 (23%)	45 (22%)	37 (18%)	116 (58%)	201
North Eastern	32 (18%)	35 (20%)	22 (13%)	120 (69%)	175
North Western	38 (26%)	21 (15%)	18 (13%)	91 (63%)	144
Southern	61 (16%)	55 (15%)	106 (29%)	229 (62%)	371
South Eastern	49 (20%)	53 (22%)	40 (16%)	154 (63%)	243
Western	49 (22%)	28 (13%)	27 (12%)	139 (63%)	219

\* Because treatment groups are not mutually exclusive, percentages do not total to 100%.

Table 9.13 Percentage of cases receiving combination therapies, by age group, 1994 – 1998: lymphoma

LYMPHOMA TYPE	SURGERY ONLY	RADIO ONLY	CHEMO ONLY	SURGERY & RADIO	SURGERY & CHEMO	RADIO & CHEMO	SURGERY, RADIO & CHEMO	NO TREATMENT	ALL CASES
all	121 (5%)	188 (8%)	1101 (48%)	34 (1%)	161 (7%)	169 (7%)	19 (1%)	507 (22%)	2300
non-Hodgkin's	117 (6%)	139 (7%)	853 (45%)	29 (2%)	154 (8%)	141 (7%)	18 (1%)	465 (24%)	1916
Hodgkin's	4 (1%)	49 (13%)	248 (65%)	5 (1%)	7 (2%)	28 (7%)	1 (0%)	42 (11%)	384

**9.8. Leukaemia ICD - 10 C91 - C95**

Table 9.14 and Figure 9.13 summarize treatment patterns for adult leukaemia cases (aged 15 and over) diagnosed in the period 1994 to 1998. Overall, 57% of these patients received no cancer-specific treatment. This proportion increased from 9% among the youngest age group (15 – 29 years) to 84% among those aged 80 or more and was higher in the North Eastern and North Western Health Boards (67% and 64% respectively).

Most of treated patients were treated with chemotherapy (43%). This proportion was higher among myeloid leukaemia cases and declined from 90% among the 15 – 29 age group to 15% among the oldest age group (80 years or older). Patients were more likely to receive chemotherapy if they resided in the Southern and Eastern Health Boards (49% and 46% respectively).

Over the time frame of this report, the proportion of patients treated with chemotherapy has increased from 42% in 1994 to 45% in 1998 (Figure 9.14) but the trend was not statistically significant.

Multiple logistic regression analysis indicated that the likelihood of receiving tumour-specific treatment decreases with age by 0.07 (95% CI 0.06 - 0.08) per year. The health board differences mentioned earlier were not statistically significant after adjustment for other factors.

Figure 9.13 Percentage of cases receiving treatment, 1994 – 1998\*: leukaemia

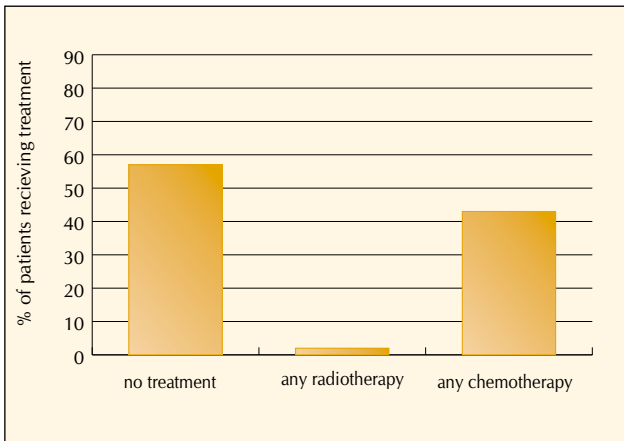
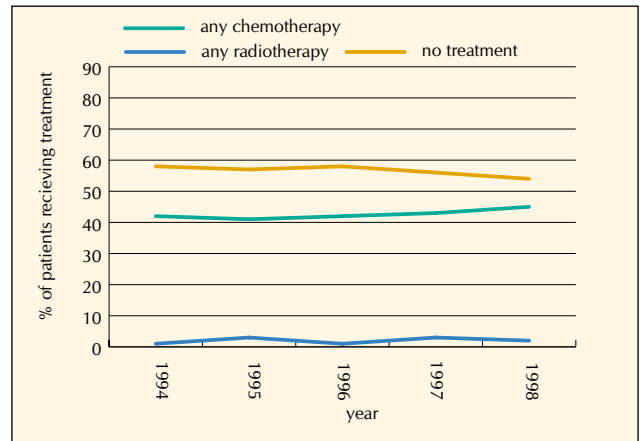


Figure 9.14 Percentage of cases receiving treatment by year of incidence: leukaemia



\* Because treatment groups are not mutually exclusive, percentages do not total to 100%.

Table 9.14 Percentage of cases receiving treatment modality by selected patient and tumour characteristics, 1994 – 1998: leukaemia\*

	NO TREATMENT	ANY RADIO	ANY CHEMO	TOTAL
all	862 (57%)	32 (2%)	648 (43%)	1517
<b>category</b>				
lymphoid	488 (66%)	19 (3%)	247 (34%)	737
myeloid	177 (36%)	5 (1%)	314 (64%)	492
other	197 (68%)	8 (3%)	87 (30%)	288
<b>age group</b>				
15 – 29	9 (9%)	9 (9%)	88 (90%)	98
30 – 39	12 (17%)	4 (6%)	60 (83%)	72
40 – 49	35 (30%)	3 (3%)	83 (70%)	118
50 – 59	73 (39%)	3 (2%)	115 (61%)	189
60 – 69	201 (58%)	10 (3%)	141 (41%)	344
70 – 79	313 (72%)	1 (0%)	122 (28%)	436
80+	219 (84%)	2 (1%)	39 (15%)	260
<b>sex</b>				
female	364 (58%)	16 (3%)	263 (42%)	632
male	498 (56%)	16 (2%)	385 (44%)	885
<b>health board</b>				
Eastern	243 (53%)	11 (2%)	210 (46%)	455
Midland	52 (58%)	1 (1%)	38 (42%)	90
Mid Western	81 (62%)	2 (2%)	48 (37%)	130
North Eastern	88 (67%)	5 (4%)	42 (32%)	131
North Western	67 (64%)	1 (1%)	38 (36%)	105
Southern	152 (50%)	7 (2%)	146 (49%)	301
South Eastern	87 (55%)	2 (1%)	71 (45%)	158
Western	92 (63%)	3 (2%)	55 (37%)	147

\*Because treatment groups are not mutually exclusive, percentages do not total to 100%.

**9.9. Melanoma of the Skin ICD - 10 C43**

Table 9.15 and Figure 9.15 summarize treatment patterns for skin melanoma cases diagnosed in the period 1994 to 1998. Only a small minority (6%) of these patients received no cancer-specific treatment. This proportion increased from 2% among the youngest age group (<40 years) to 8% among those in the 60 – 79 age group and ranged from 1% among stage I cases to 33% among those with stage IV disease. These figures were comparable with US figures where 3% of the patients received no treatment.<sup>28</sup>

Surgery was the most commonly used treatment modality. Ninety-three percent of patients were treated surgically with or without adjuvant therapy. The proportion of patients treated surgically was higher for younger patients and for women. Patients residing in the Southern Health Board were more likely to be treated with surgery than those residing in areas served by the other health boards.

The proportion of patients treated with surgery increased from 91% in 1994 to 96% in 1997 (Figure 9.16) and dropped to 93% in 1998. These changes in incidence rate were statistically significant and could not be explained by changes in age, gender or stage composition of the group.

Multiple logistic regression analysis indicated that patients were less likely to receive tumour-specific treatment if they were older. Younger patients were twice as likely to receive treatment as patients aged sixty years or over, even after controlling for sex, stage and health board of residence. Multivariate analysis also confirmed that women were more likely to be treated surgically (OR = 1.8, 95%CI 1.2 – 2.6) after controlling for age, stage and health board. The reasons behind this pattern are not clear but it could be related to the well-known gender differences in the distribution of the anatomic site of skin melanoma. Inadequate adjustment for stage (nearly 79% of cases lacked stage information) is another possibility.

Table 9.16 shows the various combinations of cancer-specific treatment modalities used to treat skin melanoma. Few patients (4%) received combination therapy. Most treated patients received surgery only.

Figure 9.15 Percentage of cases receiving treatment, 1994 – 1998\*: melanoma of skin

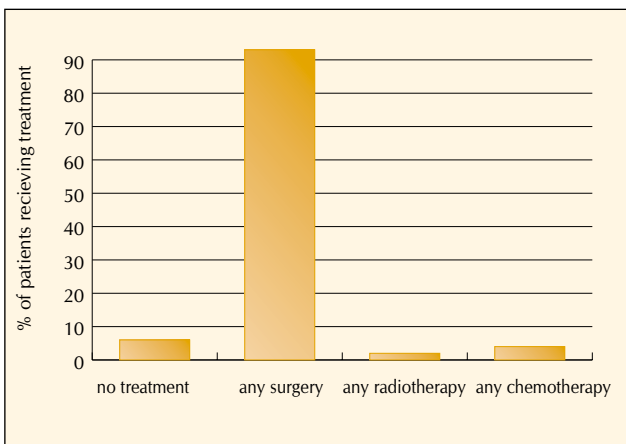
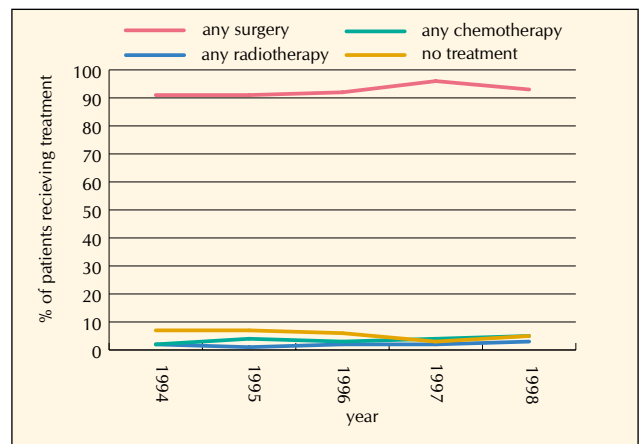


Figure 9.16 Percentage of cases receiving treatment by year of incidence: melanoma of skin



\* Because treatment groups are not mutually exclusive, percentages do not total to 100%.

Table 9.15 Percentage of cases receiving treatment modality by selected patient and tumour characteristics, 1994 – 1998: melanoma of skin\*

	NO TREATMENT	ANY SURGERY	ANY RADIO	ANY CHEMO	TOTAL
all	103 (6%)	1701 (93%)	40 (2%)	71 (4%)	1838
<b>age group</b>					
15 – 39	8 (2%)	333 (95%)	7 (2%)	18 (5%)	349
40 – 49	8 (3%)	248 (95%)	1 (0%)	17 (7%)	261
50 – 59	15 (5%)	286 (93%)	4 (1%)	15 (5%)	306
60 – 69	29 (8%)	305 (89%)	15 (4%)	14 (4%)	343
70 – 79	29 (8%)	335 (91%)	5 (1%)	5 (1%)	369
80+	14 (7%)	194 (92%)	8 (4%)	2 (1%)	210
<b>sex</b>					
female	52 (5%)	1092 (95%)	15 (1%)	29 (3%)	1155
male	51 (7%)	609 (89%)	25 (4%)	42 (6%)	683
<b>stage</b>					
I	1 (1%)	182 (99%)	1 (1%)	2 (1%)	183
II	7 (6%)	119 (94%)	0 (0%)	6 (5%)	126
III	0 (0%)	18 (95%)	1 (5%)	5 (26%)	19
IV	22 (33%)	38 (57%)	7 (10%)	15 (22%)	67
unknown	73 (5%)	1344 (93%)	31 (2%)	43 (3%)	1443
<b>health board</b>					
Eastern	44 (7%)	621 (92%)	14 (2%)	21 (3%)	676
Midland	7 (7%)	91 (88%)	4 (4%)	8 (8%)	104
Mid Western	8 (5%)	145 (92%)	4 (3%)	2 (1%)	157
North Eastern	9 (6%)	145 (92%)	4 (3%)	5 (3%)	157
North Western	5 (6%)	82 (91%)	2 (2%)	4 (4%)	90
Southern	6 (2%)	289 (97%)	3 (1%)	15 (5%)	297
South Eastern	14 (7%)	185 (92%)	5 (2%)	6 (3%)	201
Western	10 (6%)	143 (92%)	4 (3%)	10 (6%)	156

\* Because treatment groups are not mutually exclusive, percentages do not total to 100%.

Table 9.16 Percentage of cases receiving combination therapies, by age group, 1994 – 1998: melanoma of skin

SURGERY ONLY	RADIO ONLY	CHEMO ONLY	SURGERY & RADIO	SURGERY & CHEMO	RADIO & CHEMO	SURGERY, RADIO & CHEMO	NO TREATMENT	ALL CASES
1631 (89%)	16 (1%)	16 (1%)	17 (1%)	48 (3%)	2 (0%)	5 (0%)	103 (6%)	1838

## 9.10. Comments

### 9.10.1. Introduction

The purpose of this analysis was to examine trends in the patterns of care for a number of major cancers and to describe differences in case management according to certain patient and tumour characteristics. As the National Cancer Registry is population-based and the data collected are nationally representative, the data provide a perspective on cancer treatment in Ireland not available from any other source.

### 9.10.2. Tumour Stage

As expected, treatment choices were strongly associated with tumour stage. Patients with metastases (stage IV patients) were generally less likely to receive cancer-specific treatment. This was particularly true for stomach and lung cancers. Although the same pattern is shown by US hospital data from the 1993 – 1995 period, the latter showed higher levels of tumour-specific treatment for most of the cancer sites analysed in this report, even for advanced disease. Caution is required in the interpretation of these findings. The analysis was limited by incompleteness of the stage information and by lack of data on comorbidity (see below). Furthermore, comparisons were not adjusted for age and sex differences. Treatment differences should be always viewed in the context of survival. The extent, if any, to which relative under-treatment of stage IV patients in Ireland is affecting their chances of survival cannot be judged at this point.

### 9.10.3. Sex

With the exception of skin melanoma, there were no statistically significant differences in patterns of treatment between men and women. In the case of skin melanoma, women were more likely to be treated surgically than men even after adjusting for age and stage differences. However, the difference was quite small and had little practical significance. Gender differences in the distribution of the anatomic site of skin melanomas and inadequate adjustment for stage may be responsible for the observed differences.

### 9.10.4. Age at diagnosis

For all the cancer sites examined in this analysis, older patients were less likely to receive cancer-specific treatment and when treated they were less likely to receive surgery or combination therapy. Age differences persisted even after adjusting for stage, sex and health board of residence. However, these results should be interpreted with caution. It is possible that higher levels of intercurrent illnesses and reduced physiological capacity associated with old age are discouraging clinicians from recommending aggressive treatment regimes to elderly patients. It is also possible that some patients might decide not to have certain treatment because of concerns about side effects or perceived lack of benefit. In this analysis, data were not available to assess the relative contribution of these factors. Similar findings have been reported from studies undertaken elsewhere in Europe and the US.<sup>29</sup> In some of those studies, the age differential could not be completely explained by comorbidity or compromised functional status.<sup>30</sup> It was suggested that age differentials reflect age-based referral and treatment policies that are implicitly followed in primary and secondary care.<sup>31</sup> In Ireland, there is evidence that elderly patients are more likely to be treated in smaller facilities and by less experienced doctors.<sup>32</sup> Differences in referral patterns mean that older patients are more likely to be treated in centres that are incapable of providing all the required services.

Relative under-treatment of older patients might be a consequence of rationing e.g. when health resources are diverted to younger patients because they are expected to live longer and respond better. A lack of clinical guidelines and practical knowledge on cancer treatment in the elderly (who are often systematically excluded from major clinical trials) might also be involved.

Ethically, treatment decisions should not be based solely on socio-demographic factors like age, sex, social class or race. Old age is associated with impaired physiological capacity, but wide individual variations exist. Treatment decision therefore should be taken only after detailed assessment of individual risk.<sup>33</sup> A growing body of evidence indicates that older patients benefit from “aggressive” treatment just as well as younger patients do.<sup>34, 35, 36</sup> There is also evidence to suggest that older patients are as likely as their younger counterparts to agree to those treatments.<sup>37, 38</sup>

To improve the quality of care for elderly patients, a better understanding of mechanisms underlying clinical decision-making with regard to cancer treatment is required. Information on stage, comorbidity and reasons behind treatment decisions should be recorded more systematically. Clinical guidelines and treatment protocols targeting elderly cancer patients should be developed and updated regularly.

#### 9.10.5. Time trends

The analyses performed using 1994 – 1998 data suggest a small but steady increase in the utilization of non-surgical treatments for most of the major cancers discussed in this report. The most notable increases were in use of hormones to treat prostate cancer and use of radiotherapy to treat lung and colorectal cancer.

It is very likely that some of the observed trends were due to improvements in the Registry's data collection and coding procedures. This, plus the relatively short period covered by the data, makes it difficult to assess the practical significance of those trends.

#### 9.10.6. Health board differences

With one or two exceptions, differences in treatment patterns between the various health boards were not statistically significant (i.e. they could have happened by chance). The most notable exception is the lower percentage of lung, breast and lymphoma patients receiving radiotherapy in the Western and Mid Western Health Boards. The reasons for this are not clear at this point. Further investigation is required to confirm this pattern and to clarify its underlying causes.

